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SECRETARY OF AGRICULTURE

HUGH H. BENNETT
CHIEF, SOIL CONSERVATION SERVICE

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☆ THIS MONTH ☆

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WELLINGTON BRINK
Editor
Art Work by
W. HOWARD MARTIN

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CONSERVATION CALENDAR.—Calendars generally start with January. Accustomed to originating ideas that diverge from old ways of doing things, the supervisors of the Gillespie County (Tex.) Soil Conservation District, however, have put out a calendar that starts with July.

A picture on the calendar shows a fence-line contrast between a well-managed pasture and one savagely over-used. On the left side of the page for each month of the year is a list of the conservation practices that should be applied in the current month. On the right side is a pertinent statement about conservation. The statement for October reminded landowners of the election of a district supervisor to represent subdivision 1.

Small advertisements of local firms paid for printing. —DUDLEY T. MANN.

FRONT COVER.—Air view northward from Hart, Minn. The farm of Walter Feine is in the foreground; just beyond, the farm of Willard Feine. Past the Willard Feine property, also in strips, are the farms of Leo Heiden, Otto Brand, George Meyers, John Kryser, William Holz, and Emil Cordes. The photograph was made by W. H. Lathrop.

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AMERICAN INDUSTRY AND THE LAND

By WALLACE F. BENNETT

THE HARD fact that land and other natural resources are not inexhaustible has been clear to thoughtful observers for a long time. It did not emerge as a result of the rapid expansion of the industrial age. As long ago as 400 B. C., Cato, the Roman, laid down a number of principles regarding preservation of the land. In our own country, George Washington and Thomas Jefferson, among other early Americans, warned their fellow countrymen against wasteful use of the soil.

However, conservation has one fairly new aspect—which is becoming more sharply delineated every day. Conservation always has been necessary. But in former times man could postpone his reckoning with nature by emigrating from an area which he had exhausted of fertility. Now there is practically no place left for him to run to.

We have to stand and fight for what we have—in the place where we are. Either we maintain and improve our basic wealth—timber, soil, and water—or we allow them to decline. If they do decline, so will our standards of living, our individual freedoms, and the very security of our country.

Industry is acutely aware of the urgent necessity for action in the field of conservation. As a reflection of that awareness, the National Association of Manufacturers has set up a new committee group—the Committee on Timber, Soil, and Water Conservation. More than 70 manufacturers, representing both small and large companies, have consented to serve this year on the committee. All have a deep interest in conservation, and special knowledge of certain phases of the problem.

The chairman of the committee is George M. Gadsby, president and general manager of the Utah Power & Light Co., Salt Lake City.

C. M. Malone, vice chairman of the Second National Bank, Houston, Tex., and Lloyd Partain, manager of the commercial research division, Curtis Publishing Co., are vice chairmen.

Each of these men brings to the voluntary task of guiding the work of the committee a long and active personal history of conservation work and study.

Gadsby is an authority on the country's water supply, whose falling levels represent one of our most serious conservation problems.

After graduation from the Massachusetts Institute of Technology in 1909, Gadsby joined the Warren (Pa.) Water Co. as a chemist, and later became its superintendent. Before joining the Utah Power & Light Co. in 1929 as president, he was associated with various utility companies, including the West Penn Power Co. in Pittsburgh, of which he was president.

NOTE.—The author is president, National Association of Manufacturers.

In addition to serving as chairman of the full NAM Conservation Committee, Gadsby heads the subcommittee on water conservation.

Malone is director of Friends of the Land, and has devoted much time and energy to organizing the soil conservation movement in Texas. He has directed a continuing campaign to enlist the support of every individual, group, and business in his State in preserving the soil—because, as he puts it, "every inch of topsoil lost will affect everybody's living conditions in the years to come."

He is also serving as chairman of the subcommittee on soil of the NAM group.

Partain, who heads the subcommittee on timber, long has been active in conservation work and has done a considerable amount of research in the field. He is the author of numerous articles on conservation and has addressed many audiences on various phases of the urgency of protecting our natural resources.

The NAM Conservation Committee has begun its work in the consciousness that industry has an obligation to make the fullest possible contribution to conservation of our resources, as this country enters upon a third, critical phase of its existence.

In the first period, our forefathers' principal objective was the acquisition and occupation of land. The expanse of America seemed limitless; the relationship with the land was in those times to win it and to tame it.

Next came the stage of developing the land that had been conquered. This our people did with magnificent energy—but with too little regard for the future of our renewable natural resources. It seemed then that we could never run out of new land, new timber tracts, and water.

Having conquered and developed the land, we are now beginning a third period. The remaining small areas which may be made productive are not likely to be significant. No longer can we abandon one place and move along to another. The wisest use of all of our land, timber, and water is fundamental to the economic and social welfare of our entire population, and to the security and strength of our position among nations.

According to a conservative estimate, 65 percent of all the new wealth created in this country originates in renewable natural resources—as agriculture and forestry. The other 35 percent is from nonrenewable sources, such as mining and petroleum. It seems clear that as our nonrenewable resources diminish, we are apt to become more and more dependent upon our renewable resources.

Should we allow our renewable natural resources to fail, our American way of life will be affected seriously. One of the reasons this Nation has been able to develop its highly productive industrial economy, which has raised the living standards of all to such high levels, is that it has taken only a comparatively small amount of our national energy to feed ourselves.

Specifically, about 25 cents out of the American dollar, on the average, is spent for food—which leaves about 75 cents for processed and manufactured goods of all kinds. This can be directly attributed to the fact that we have had available so vast an extent of productive land and forests.

England, by comparison, must devote about 35 cents out of a dollar for food; Italy, 55 to 70 cents; and in China or India, some 90 percent of the monetary units must go just to satisfy hunger.

These money ratios can be translated roughly into human time and energy. Food is our first need and if necessary, all of our efforts will be expended in getting it. The less effort required for food, the more we have left for the production of other factors which make up a prosperous and progressive civilization.

The first task of the NAM Committee on Timber, Soil, and Water is to determine what is now being done in the conservation field. Then it will survey the need for action in those areas of the problem in which industry and the NAM as an organization can be helpful. The committee is seeking to cooperate with all other groups and agencies concerned with preservation of our natural resources.

Conservation is vital to the well-being of every individual in the nation. It is of immediate urgency to industry, as to every part of our productive economy—and it is my belief that industry has a major role to play in the effort to make conservation an active principle in our national life.

DISTRICT PROFILE

CORNWALL of WASHINGTON

J. W. Cornwall.

J. W. "Wes" Cornwall has built up a run-down 400-acre wheat ranch in the famed Palouse country of eastern Washington to the status of a 2,100-acre conservation show place. He is a big friendly man with a zest for farming and a love for soil. Over the past 10 years he has become one of the Northwest's great champions of soil conservation.

"Wes" Cornwall was not a born conservationist. He concedes that he had to learn about erosion and soil depletion the hard way. Looking back to the 1920's, he recalls with a grin that he was just about the worst farmer in the county. "I did everything wrong. I mined the soil and never put anything back. The easiest way to get rid of stubble was to burn it. People talked about humus and carbon-nitrogen ratios in those days but it went right over my head. I didn't see any need for systematic crop rotations. All I thought of was wheat. Worst of all, I was a fallow farmer. It's no wonder I almost went broke!"

Cornwall says he "woke up" along about 1933–34. "By then, my wheat yields were down to the point where I knew I either had to change my methods or quit. Several years before, I had switched from the use of a binder to a combine. Putting all of the straw back on the land was too much of a shock to the soil. My yields decreased rapidly. That was bad but erosion was even worse. Between the two I was about licked. It looked like erosion and lack of fertility were going to run me off the place."

Cornwall sought out William J. Green, longtime county agricultural agent for Spokane County, and asked advice. Green was a believer in the use of sweetclover to build fertility and restore organic matter. He told Cornwall, "You can't use stubble without using sweetclover—both must be used." He also urged Wes to seek help from the Soil Conservation Service. That Cornwall did. Technicians interested him in a systematic crop rotation which included sweetclover, alfalfa, and grass. They went over his place, field by field and acre by acre, showing where erosion was worse in some places than in others, how he could control it, what he needed to do to get his farm back on a paying basis. They worked out a detailed conservation farm plan. Cornwall still has that first plan, as well as additional plans drawn up later as he added new land to his holdings. But it has been many years since Wes Cornwall has had to refer to such a plan. He has been farming the conservation way so long now that it is second nature.

From the time Cornwall became a conservation farmer he had crusaded ceaselessly to get others interested in putting a stop to erosion. He started by talking conservation among friends and neighbors.

Cornwall ruefully admits that he may have "rubbed a few people the wrong way" in his enthusiasm. His neighbors in the Mount Hope community sometimes find it hard to understand the change that has taken place in Wes Cornwall. Commented one, "When young Wes first started farming, he didn't even know what soil conservation meant. But to hear him talk today, you'd think it was a crime to let a little soil wash away." The comment is accurate. When Wes Cornwall starts talking about soil conservation he is deadly serious. The lingering twinkle in his eye disappears and his jaw takes a determined set. He doesn't think anyone has the right to destroy soil and seldom hesitates to let others know how he feels.

In 1936 Cornwall worked with Green and others in organizing a soil conservation association in his

community and later, in 1939, played a prominent role in persuading the Washington legislature to pass a soil conservation district law. He was a leading figure in organizing Latah-Rock Creek Soil Conservation District and has been active in district affairs ever since.

Cornwall's zeal thrust him into State-wide prominence in 1946 when he was named president of the Washington Association of Soil Conservation Districts. This association sent him to the annual meeting of the National Association of Soil Conservation Districts in 1946 and again in 1947. He attended at his own expense in 1948 and 1949. His warm personality and friendly, sincere counsel have earned him scores of friends among the national leaders in soil conservation. He has worked diligently toward a Nation-wide policy in promoting conservation through soil conservation districts but has never lost sight of the needs of his own community. He is still an active officer of his local district, where his booming voice and hearty laugh are familiar parts of most meetings of the Latah-Rock Creek board of supervisors.

Cornwall gets frequent requests for the magic formula that made it possible for him to transform a run-down, 400-acre Palouse ranch into a 2,100-acre soil conservation show place. "There isn't any magic formula," he says, "it's just common sense and hard work." He does, however, pass along some tips: "You can't control erosion without working stubble back into the soil. And you can't use stubble without growing legumes, preferably alfalfa or sweetclover in a mixture of grass. Legumes add nitrogen and stubble adds carbon. Both add organic matter. But when you use one, you have to follow up with the other to get the right balance. Legumes open the ground so moisture can get in instead of running off. Mix grass with both sweetclover and alfalfa. It will more than double the amount of roots you get in the soil. When you work stubble, disk it roughly and leave a large portion on the surface. Stubble rots quicker that way and soil clings to it better. Use all the manure you can and never summer-fallow in areas where the annual rainfall is 18 inches or more. Few Palouse soils can hold more than 1 year's rainfall at a time. Heavy rains after summer fallowing are almost sure to cause erosion."

Wes Cornwall is not farming alone anymore. He's getting lots of help from his two young sons, Don and Neal. Both are chips off the old block and are sticking closely to their dad's soil-saving methods. Cornwall now divides his time about equally between three major interests—the ranch, soil conservation, and a newly acquired farm-implement agency in nearby Fairfield. Merle, his wife, is trying to create a fourth major interest—their new home in Spokane. She hasn't had too much success. Her arguments frequently go like this, "Wes, why don't you quit trying to stop all the erosion in the State of Washington in 1 day. It can't be done." Wes Cornwall knows she's right. But he probably won't quit trying.

—W. L. Southworth.

SMOOTHING OUT THE RICE FIELDS

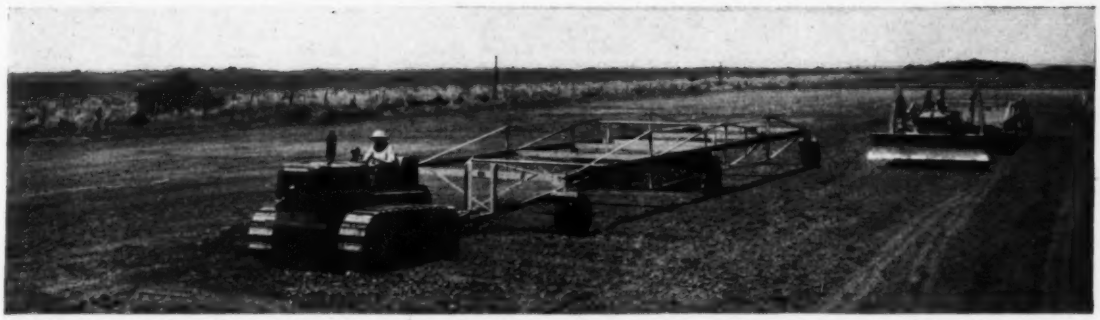
By DELOUIS SOILEAU

PASTURE rotation and land-leveling operations by big machines are boosting yields of rice in Louisiana. It may not be many years before Louisiana catches up with California in rice production per acre.

Much credit is due Maple Hughes for the trend toward land leveling in the Louisiana rice belt. A rice farmer himself in the Lake Charles area, Hughes went to California in 1946 to find out why west coast farms produce more than twice as much rice per acre as Louisiana farms. The only difference he could figure out was that the Californians leveled their rice fields flat as a pancake. On the other hand, Louisiana farmers left their fields studded with mounds or knolls. Most of the mounds were small, generally running from ½ to 4 feet in height. Some of them were big, 25 or 30 feet long, 15 or 20 feet across, and 5 or 6 feet high. The farmers tried to grow rice on the smaller mounds by raising the level of the irrigation water. That took a lot more water but it didn't produce very much more rice. When you count in the area of all those unproductive mounds, it's no wonder rice yields in Louisiana were low.

When Hughes returned from California he bought some of the big land-leveling machinery.

Note.—The author is with the Soil Conservation Service, Crowley, La.



These 60-foot land-leveling machines are putting the final touches to an 80-acre rice field on the Maple Hughes farm. Usually twice back and forth across the field is enough. When this fifth step in leveling operations is finished, the field is smooth as a billiard table, and the soil as soft as velvet.

Maple Hughes.

He went to work on his own farms and told all the farmers he knew about his observations in California. Because of his interest in modern farming, he was elected to the board of supervisors of the Gulf Coast Soil Conservation District and made vice chairman.

Land leveling is rated by the Soil Conservation Service as an important practice in a coordinated program for rice farms. Convinced of the value of land leveling, the Gulf Coast District, in which mounds are common, not only adopted the practice but bought a bulldozer and two land levelers for cooperating farmers to use in flattening out their fields.

Hughes went to work leveling his rice fields. His first real test of production came in 1948 when he leveled and planted a 45-acre field to rice. His yield was 24 barrels of dry rice per acre.

"I had never raised more than 10 barrels on that field before," Hughes said. "Usually it was 8 or 9 barrels."

On another farm Hughes increased his yield 5 barrels per acre on a 250-acre field. He said:

"I leveled the field in May 1948. I seeded some of it by drill and water-planted the rest by plane. I needed only half as much water as formerly and that was a lifesaver in a dry year. I had to irrigate 300 acres for a neighbor as well as 600 acres of my own, all from two wells.

"I saved half the labor usually required in irrigation. On top of all that, I got 13 barrels per acre with Rexora rice on my 250-acre field. On an adjoining 160-acre field, where all conditions were the same except that it had not been leveled, my yield ran 8 barrels."

Land leveling costs $10 to $15 per acre where conditions are average. A big land leveler does 30 acres a day.

"I plan not to plant any more fields to rice until they have been leveled," Hughes stated. His conservation program also includes improvement of pastures with high quality grasses and clovers and rotation of rice and improved pasture.

With Hughes' experience to guide them, about half the farmers cooperating with the Gulf Coast Soil Conservation District have added land leveling to their general conservation program.

Land leveling provides for more efficient irrigation and drainage, thereby enabling the farmer to grow grasses and legumes that add organic matter

(Continued on page 92)

CANAL LININGS TESTED IN FIELD

By C. W. LAURITZEN and
O. W. ISRAELSEN

LOSSES in conveyance of irrigation water represents one-third to one-half of all the water diverted for irrigation purposes. Since there is more land which could be irrigated than there is water with which to irrigate it, conveyance losses constitute a limiting factor in western agricultural development. These losses could be greatly reduced, if not largely eliminated, by lining irrigation canals and laterals. This fact is generally recognized and yet, of the 125,000 miles of canals and laterals in the Western States, only about 5,000 or 4 percent are lined. The primary reason more canals are not lined is the high cost. Cost, however, is relative and as agriculture and industry expand the pressure to provide water to meet increasing requirements will result in the gradual lining of a large percentage of the canal mileage in contrast to the low percentage today.

The initial expenditures necessitated by a general canal lining program would be great but maintenance costs should be considerably less. Some canals have been lined since the early days of irrigation. Nearly every type of construction material has been used with varying degrees of success. The problem today is to develop better and cheaper linings. Research has brought substantial progress in the use of new materials and the improvement of construction methods. Continued investigation is the best way to advance progress and provide information which will save water users heavy expenditures in the future.

The demand is growing for information on canal lining. In some instances irrigators and commercial firms are undertaking research at their own expense; others have shown sufficient interest to make contributions to organizations engaged in canal-lining research. This article cites an instance in which a group of irrigators and a number of other interested concerns pooled their efforts to advance canal-lining research.

The water which supplies the Richmond Irrigation Company Canal represents a portion of the natural flow from High Creek. High Creek is a stream located in the vicinity of Richmond, Utah, and like all mountain streams in western United States is characterized by large flows in the spring and early summer which decrease rapidly with the advance of summer. Since water was first diverted from High Creek to the company canal there has been a shortage of water late in the season with the result that most of the farmers in the area must limit their crops to those which mature early. The irrigators for many years were aware of the heavy seepage losses but did nothing to correct them.

Precast concrete slabs over a soil-bentonite lining in foreground, and precast concrete slabs with mastic-sealed joints in background.

In the summer of 1947 a number of the directors of the company visited the Irrigation Research Laboratory at Logan, Utah, as a part of an Extension Service tour. At the laboratory, which is operated by the irrigation division of SCS in cooperation with the Utah State Agricultural Experiment Station, they observed a number of different types of canal linings being tested to determine their characteristics as a basis for the

NOTE.—The authors are, respectively, project supervisor, division of irrigation research, Soil Conservation Service; and irrigation engineer, Utah Agricultural Experiment Station, Logan, Utah.

Butyl-coated fiberglas lining showing lap joint. The 4-year-old lad belongs to co-author Lauritzen.

development of better and cheaper lining materials. It was found that most of the seepage from any canal usually occurs in rather localized sections and that the first step in undertaking a canal-lining program should be to determine the location of heavy losses. The company officials felt they knew where the heavy losses were to be found and with the assistance of the Extension irrigation specialist made some measurements which demonstrated that 51 percent of the water was lost in a canal length of about 2,200 feet beginning at the point of diversion from High Creek and ending where the canal left the gravel fan at the mouth of the canyon and took its course over the finer textured lake-laid sediments. They were astounded at the amount of water they were losing in this short distance and contacted the irrigation division of the Soil Conservation Service for guidance. Some general recommendations were made and it was suggested that they employ an engineer and have him prepare specifications for lining the section found to be subject to this heavy loss. A few weeks later, however, company officers returned and asked if the Soil Conservation Service or the college would direct the job. Eventually, Service and college undertook a strictly research project on a cooperative basis. It was agreed to try out a number of different linings, some of which would probably require abnormal maintenance and might indeed have to be replaced.

Inasmuch as the installation of a field test would be more costly than a standard lining job, three commercial firms interested in sponsoring the use of certain materials were asked to participate. They accepted and made substantial contributions in labor, materials, and technical advice. Construction was begun in March 1948 and, after an interruption to permit water deliveries through the summer, was resumed and completed in the fall of the same year.

The field test at Richmond consists of 729 linear feet of concrete, 400 feet of shotcrete, 300 feet of precast concrete slabs, 100 feet of gravel-covered soil-bentonite, and 113 feet of butyl-coated fiberglas, in the main canal. These linings were supplemented by 200 feet of butyl-coated fiberglas lining in one of the major laterals. Associated control structures included 230 feet of 24-inch and 75 feet of 12-inch galvanized pipe; a culvert of 4-foot concrete pipe 40 feet long, one drop structure and three concrete diversion structures.

The original canal skirted along the foot of a gravel escarpment. It was winding and its banks had a heavy growth of trees and shrubs. In cross section it was 10 to 15 feet wide and about 1 foot deep. The cost of clearing and shaping the old channel for lining was estimated to equal the cost of relocation, even though some rather heavy cuts and fills were involved. It was decided to relocate in order to provide better alignment. In so doing, the length of this canal section was reduced by 500 feet.

The concrete linings included two thicknesses, 3-inch and 2-inch, with and without reinforcing. Steel bars $\frac{3}{8}$ inch in diameter placed on 1-foot centers both ways was the reinforcing used in the 3-inch concrete. In the 2-inch concrete, No. 10 wire mesh having 6-inch openings was used. The concrete was placed in 10-foot panels. Alternate

Concrete lining under construction.

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panels were installed and after the concrete had hardened the connecting panels were poured, employing the panels poured first as guides for shaping the connecting panels. The alternate panels poured first were all of standard concrete, the mix employed being approximately 1:2:3. Maximum size of aggregate was 1½ inches for the 3-inch concrete and 1 inch for the 2-inch concrete. Two types of finishes were used, the standard steel trowel finish of years past and a broom finish. These two finishes were applied alternately to each successive panel in the order of their installation. Standard concrete to which an air-entraining agent, vinsol resin, was used in pouring the connecting panels. The two finishes used with the standard concrete were repeated with the air-entrained concrete, following the same sequence. It will be seen, therefore, that the concrete linings include comparisons of two thicknesses of concrete, concrete of the same thickness with and without reinforcing, and two types of finishes; each of these for both standard and air-entrained concrete.

Shotcrete linings of four different specifications were installed to obtain further information on the comparative value of this type of lining, the need for reinforcing and the minimum thickness which would be required to be serviceable under conditions in this area. The four experimental sections consisted of 100 linear feet each of 2-inch shotcrete with and without reinforcing and 1½-inch shotcrete with and without reinforcing. No. 14 wire mesh with 2-inch openings was the reinforcing material used in both the 2-inch and 1½-inch shotcrete.

Three sections of precast concrete slabs were installed. In one section the slabs were laid directly on the subgrade and the joints sealed with a mastic. The other two sections of slabs were laid in one case over a 4-inch blanket of soil-bentonite and, in the other, over a 4-inch blanket of silt loam of moderately low permeability. In the latter two sections the slabs functioned chiefly as a protective covering for the low permeability earth linings which they topped.

The gravel cover over soil-bentonite lining could not withstand the velocities encountered at the head of the section as the water left the concrete and an additional covering of rock riprap was made to afford the necessary protection. While the rock riprap might have been restricted to the head of the section it was extended to cover the entire section as a precautionary measure.

The butyl-coated fiberglas was manufactured specifically for the tests at Richmond and similar experimental installations at other locations. It consists of butyl rubber calendared onto fiberglas cloth, the cloth having 10 threads per inch both ways. The fabric resulting is approximately 0.03 inch thick, fairly strong and highly resistant to deterioration from weathering and biological activity. To employ the fabric as a lining for canals, it was laid directly on the subgrade and anchored in place by burying the edges along the sides and the upstream end in shallow trenches. The downstream end is left loose and laps over the upstream end of the succeeding length of fabric. The experimental installations have been made in 30- to 50-foot lengths. The lengths might be made longer or shorter. It will probably be desirable to limit the length to 50 feet, however, to facilitate installation and to localize damage in the event water gets under the lining, whether it be due to a break in the fabric or other circumstances. Since the joint is open, any water which gets under the upstream length of fabric will take its course on top of the lining in the next section. This protective feature is the basis of the joint design adopted.

The total cost, including contributions except for technical services, was slightly less than $10,000. There are approximately 6,300 shares of stock in the company, slightly more than a share per acre of irrigated land. To finance the cost of the lining, the company has increased the assessment from $0.75 per share to $1.50 per share. This increase in assessment will pay the cost to the company in 2 years time. The water available in late season will be nearly double, as a result of the reduced seepage losses from the section lined. Canal maintenance costs will be reduced in the future, and delivery efficiency increased. It seems probable that increased crop production will add greatly to the returns on the investment.

Irrigation companies can line their canals without incurring heavy indebtedness by lining short sections each year and financing the work on a pay-as-you-go basis. It is important, if such a procedure is adopted, to precede any lining by the preparation of a complete plan of lining and improvement, including a general design, supported by field surveys and an evaluation of site conditions. This is necessary if the finished job is to have good alignment and advantage is to be taken of opportunities for shortening the canal. It is desirable, although not essential, to determine the specific lengths of canal in which seepage losses are greatest, since lining these sections first will increase the efficiency of the system the most per dollar expended.

There has not been sufficient time to test the relative durability of the various experimental linings. To date, all are intact and functioning satisfactorily. It appears that under certain circumstances the character of the butyl-coated fiberglas installations may have to be modified and it may be that the fabric itself will be subject to deterioration under certain flow conditions. Because of the experimental character of the linings it is anticipated that above-average maintenance costs will be associated with some types of lining represented and after a few years certain linings may have to be replaced.

Field tests such as the one described are an essential part of canal-lining research. At Logan the canal-lining research program may be subdivided into three parts as follows:

1. Investigation of materials for canal lining, such as an evaluation of physical properties and ways of modifying these properties.

2. Model testing of linings to determine their behavior

(Contained on page 89)

THESE YOUNGSTERS MADE FRIENDS WITH THE SOIL

A mighty important subject grips the eyes and minds of these children, as they get a preview of what they will see on their field trip.

By LESTER FOX

CITY KIDS aren't letting their country cousins get ahead of them in knowing all about the need of conserving our soil and water resources. Institutions like the Fort Worth Children's Museum are seeing to that.

The museum in the Texas cowtown is looking out for the welfare of the city's youngsters in a variety of ways. One is a summer study course for children of all ages from 5 or 6 up to 14 or 15. Each week a different subject is studied. Once a week the children are taken on a field trip so that they can see and feel the things they have been studying.

One week recently the youngsters studied about soil conservation. Then they took to the field to look things over. Before they started they heard a short talk about the things they were to see and viewed enlarged photographs of erosion and of measures that control erosion and maintain the productiveness of the soil. The talk was given by David O. Davis of the Soil Conservation Service in the museum's little theater where educational movies, art crafts, puppet-show writing, costuming and staging, and a lot of other activities keep the children busy during the year.

The field trip was made by chartered bus. Davis went along and pointed out the things the children should observe, just like a barker on a rubberneck bus for tourists. At selected spots stops were made where the 35 children hopped out and Davis explained things while the youngsters actually observed what he was talking about.

Mrs. Anne H. Webb, director of the museum, well versed in conservation herself, helped on the tour. Mrs. Webb plans and conducts the museum study courses and other activities.

NOTE.—The author is information specialist, Soil Conservation Service, Forth Worth, Tex.

Roadside erosion is considered here.

At one stop the children observed roadside erosion while Davis told them what caused it, pointing up an adjacent slope where a gully had started and cut its way down to the road and then gouged out a deep and dangerous ditch along the roadway.

At another stop the children saw a field of weeds and inferior grasses. They were told how once the field was covered by Nature with tall, nutritious grasses that were plowed up for row crops. With the good cover of grass gone, there was nothing to protect the soil against lashing rains that washed the topsoil down the slope. Soon the field was no good for row crops. Eroded and depleted, it was left idle. Weeds and poor quality grasses came in. Now the field furnished only a little low-grade grazing. All of this was explained in simple language that the youngsters could understand and remember.

The bus made another stop where the land had been properly protected and there was an abundance of good forage grasses. The children saw what good grass looked like. They felt it and examined it.

A popular stop was made on the Clear Fork of the Trinity River where the water was fresh and sparkling and the riverbed pebbled with interesting stones. There the children enjoyed the lunches they had brought. Then they waded in the cool water, examined the riverbed and learned how that peaceful Clear Fork has on numerous occasions caused serious flood damage because of eroded and depleted farm land further up the watershed.

After lunch Davis summed up what the youngsters had seen. When they returned to the museum the youngsters filled out a questionnaire that brought out the knowledge they had gained.

On the ride back to the museum one little boy, 7 or 8 years old, pointed out the bus window to an ugly gully. Turning to his younger companion, he said:

"That's soil erosion. Isn't it pitiful?"

Not always is this stream pleasant for wading. These children learned why.

PROFITS FROM IRRIGATED PASTURE

By A. J. WEBBER

MURRAY WEBB, dairy farmer of St. George, Utah, and owner of the highest-producing herd in Washington County during 1948, figures that irrigated pastures are worth $230 an acre annually, according to A. J. Webber of the Soil Conservation Service.

Webb has been cooperating with the Lower Virgin-Santa Clara Soil Conservation District since August 1940. It was not until 1946 that he planted his first irrigated pasture. This planting was made on 3¼ acres of fairly good agricultural land which had become affected by a high water table.

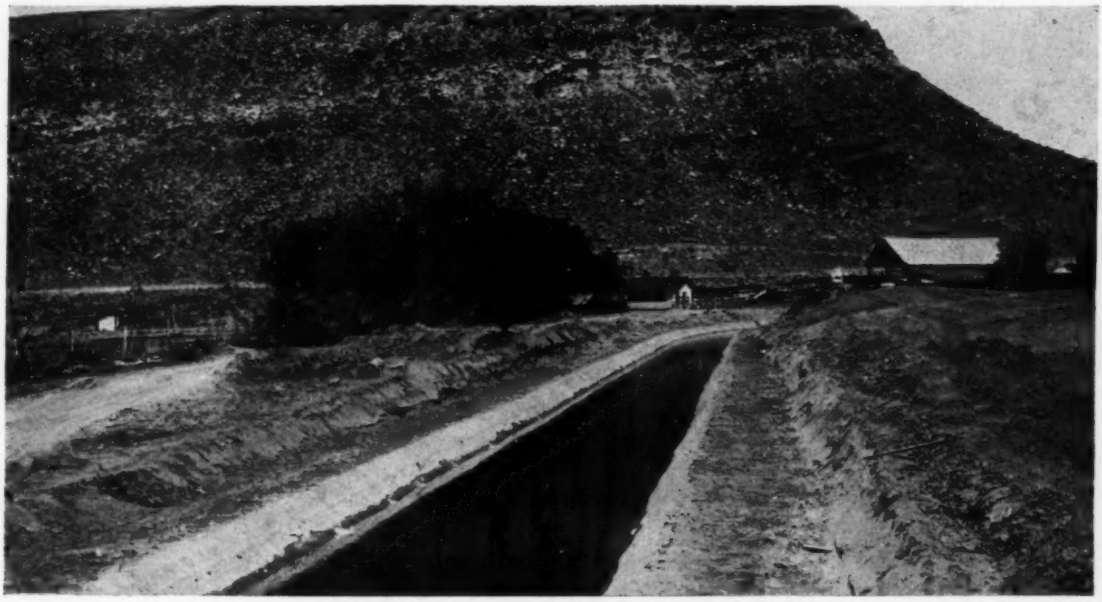
NOTE.—The author is district conservationist, Soil Conservation Service, St. George, Utah.

First, Webb used a Soil Conservation Service dragline on loan to the district to construct a drainage ditch to make the tract more suitable for improved crop production. The pasture was planted as a demonstration in cooperation with the district. The Soil Conservation Service provided a seed mixture including perennial ryegrass, orchard grass, meadow fescue, alfalfa, yellow sweetclover, and Ladino clover.

Webb did an excellent job of getting the pasture started by preparing a good seedbed and by applying the proper amount of irrigation water when needed.

After the pasture became well established, Webb divided it into three fields for rotation grazing. These fields also served as a basis for three trial fertilizer treatments in connection with the demonstration.

Pasture No. 1 received 10 tons of barnyard manure, 200 pounds of 43-percent treble superphosphate, and 175 pounds of ammonium sulphate per acre per season.



Here's the ditch from which Webb irrigates.

Murray Webb estimates that the 3¼-acre irrigated pasture on which these Jerseys and Holsteins are grazing is worth $230 per acre annually to him in increased butterfat production and lowered feed costs.

Pasture No. 2 received 10 tons of manure and 200 pounds of 43-percent treble superphosphate per acre per season.

Pasture No. 3 was given 12 tons of barnyard manure per acre per season.

Pasture No. 1 yielded 25 percent more forage than did the plot receiving manure alone. Pasture No. 2 yielded 16 percent more forage than No. 3.

The 1948 grazing season lasted from April 17 to November 30, or a growing period of approximately 7½ months. This gave a total of 1,475 animal-months grazing with an average yield on the entire pasture of 2.1 animal-months grazing per acre. An average height of 4 inches of grass growth was left on the pasture at the close of the grazing season.

According to the 1948 records of the Washington County Dairy Herd Improvement Association, Webb's herd of 16 head of Jersey and registered Holstein cows produced an average of 435 pounds of butterfat per cow during the year. His average butterfat production had been 418 pounds for 1947 and 390 pounds for 1946. Webb attributes this consistent increase in butterfat production to improvement in the quality of his herd, proper management, improved feed rations, and a good pasture.

"Every day my dairy herd was on this pasture was worth $10 saved in feed costs and in increased production," Webb declared.

Calculated on the basis of increased milk production while his dairy herd was grazing on the pasture and on the basis of reduced hay consumption during that time, the irrigated pasture was worth $230 an acre annually. In determining this value, Webb estimated alfalfa hay at $25 a ton, and the price of milk at 38 cents a gallon.

As a result of this and other trial plantings in the St. George area, it has been observed that certain grass species yield better than others. A higher-producing mixture than the one used by Webb now is being generally recommended for irrigated pastures in the Lower Virgin-Santa Clara Soil Conservation District. This mixture includes perennial ryegrass, orchard grass, tall meadow oatgrass, alto fescue, alfalfa, Ladino clover, and yellow sweetclover.

Because of extreme variations in climate and soil conditions in this locality, no one grass mixture is recommended for all plantings. Technicians recommend a check of soil, water table, alkali, and water conditions on all areas designated for pastures in order to arrive at the most suitable mixture.

HOW GOOD FISHING CAME TO BUFFALO LAKE

By PHILIP F. ALLAN

BUFFALO LAKE—listed on Soil Conservation Service records as Tierra Blanca Land Utilization Project, TX–LU–21—is a good place to fish. It hasn't always been good. In fact, the fishing a few years ago was downright poor. But now you can be fairly certain of a nice string of channel cats, bass, bluegills, or crappies.

Buffalo Lake varies in area, according to rainfall, from less than 300 acres in the driest years to more than 1,800 acres in the wettest. It can hardly be called a pretty lake, although picturesque canyons flank its lower reaches. In fall and winter waterfowl visit it by the tens of thousands—mallards, pintails, teals, redheads, canvasbacks, Canada geese, and a host of others—all protected from hunters' guns.

Buffalo Lake was first opened to fishermen in June 1940. It had been stocked with unknown numbers and kinds of game fish, and mudcats in Tierra Blanca Creek had done their bit to load the lake with fish. The catches in June that year were phenomenal. On the opening day more than 5,000 bass were caught—some folks guessed 50,000! The fishing was too good to be true, and it didn't last.

Water started dropping in 1941, and continued until only a channel full of water remained. Then, all at once the rains came. Buffalo Lake, which

NOTE.—The author is regional biologist, Soil Conservation Service, Fort Worth, Tex.

Mike Green and W. B. Henderson proudly display 32 channel cat caught in Buffalo Lake.

many had predicted would never be full, soon was overflowing. The lake was restocked with game fish—but the mudcats got there first. The waters near the dam were black with tiny catfish. An estimated 11,000,000 of them were removed. Catfish fishermen protested, but still Buffalo Lake was overstocked. It became the habit of the drivers of fish-hatchery trucks to dump any surpluses they happened to have into the lake.

Creel, season, and size limits on fish, more restrictive than the State fishing laws, were removed. The Texas Game, Fish, and Oyster Commission then removed all limits from crappies in the lake. The following year seasonal limits on fishing were removed all over the State.

Except for catching mudcats and stunted crappies, fishermen were usually disappointed. There was no successful reproduction of bass, bluegills, or channel cats in Buffalo Lake during those years. The number of fishermen visiting the lake declined. Every test showed serious overstocking. The old cry for more stocking went up.

In 1945 an effort was made in cooperation with the Texas commission to remove catfish and other rough fish by means of a large trammel net. Several thousand pounds were removed. Subsequent inspection showed that there were still too many catfish. In July 1946 the United States Fish and Wildlife Service provided a 175-foot seine and an expert seiner. With the help of hired labor—and almost too much voluntary labor—Buffalo Lake was seined for a period of 2 weeks.

More than 7,000 pounds of catfish were removed. Anyone willing to carry the fish away were welcome to them. Folks turned out by the hundred. With each haul of the seine 200 to 600 large mud-

cats were taken, and each time they quickly vanished into sacks, garbage pails, washtubs, or whatever container was at hand.

The seining operation showed that channel catfish had successfully spawned. And within a week inch-long bass, the first in many a year, appeared.

Homer S. Swingle the expert fisheries scientist of the Alabama Agricultural Experiment Station, inspected Buffalo Lake during the seining operation. It was his opinion that proper stocking of bass and bluegills might restore a balance of fish in the lake. In 1947 such stocking was made, using the numbers recommended for the acreage of water at that time.

Since 1945 Buffalo Lake has made continuous improvement—but not entirely due to seining and stocking. In 1947 the Panhandle Outdoor Sportsman's Club initiated a fishing rodeo. Large, tagged fish—with prizes on their heads—were released in the lake. There was a great flurry of fishing. That year 47,253 fishermen fished there—an increase of 29,012 over 1945.

In 1948 the rodeo—and better fishing—attracted 70,459 fishermen. The 1949 rodeo—with such attractive prizes as a trip to Alaska, won by D. H. McCrary of Sanford, Tex.—started off with a record-breaking 21,659 fishermen in May. The heavy fishing is paying off in larger fish and better catches. It demonstrates that there's no such thing as overfishing Buffalo Lake, or perhaps any lake.

Each year since 1945 observations have been made on the reproduction of game fish—the key to "balanced" fish populations. And each year the condition has been satisfactory. The mudcat fishermen are not disappointed, either. There are still plenty of mudcats.

It isn't always easy to apply good fish-management principles to a large lake, especially after it once becomes overstocked. Buffalo Lake, however, shows that poor fishing lakes are not hopeless.

PASTURE ROTATIONS IN THE RICE BELT

By W. M. NIXON

ECONOMISTS say that when world conditions settle into something like normal, American farmers will have to grow rice more efficiently to stay in the market. They point out that there will be strong competition from countries where yields are high and labor costs low.

Farmers in the Louisiana and Texas rice belt are solving the problem that the economists foresee. They are getting much higher yields through the rotation of rice with legumes and grasses, a system that is part of the districts' coordinated conservation program. In this way, growers are also obtaining diversification, and greater income from livestock. Their cattle show amazing gains on improved pastures between rice crops.

Of course, it takes time for new methods to take hold. But it's easy to see the profit argument in this rotation system and district cooperators are fast adopting the new way.

Dr. W. B. Sturgis and R. K. Walker of the Louisiana Agricultural Experiment Station developed this cropping system. They have several years of results to prove its value.

Their records show that as much as 293 pounds of beef per acre were produced from February 10 to November 15 on white clover, Kobe lespedeza, and Dallis and Bermuda grass pastures. This was a gain of 580 pounds of beef per animal. The pastures were seeded in 1942; the yields were figured in 1945. Four hundred pounds of 3–12–12 fertilizer were applied at seeding time.

Rice fertilized with 200 pounds per acre of 4–12–8 after 3 years of improved pasture yielded 19.2 barrels per acre, more than 3 times as much as the 6 barrels per acre on a similar field that had been left idle and unimproved for 3 years.

Adolph Daigle, a cooperator with the Acadia Soil Conservation District, harvested more than 20 barrels of rice an acre on his farm near Church Point, La. This yield was obtained on 60 acres of rice planted following improved pasture. The previous yield from the same acreage was 12 barrels per acre.

Three years ago, Daigle established white-clover pasture on part of this acreage and lespedeza pasture on the remainder. Two hundred pounds per acre of 20-percent phosphate were applied to a well-prepared bed before clover was seeded. The pastures furnished excellent grazing for Daigle's cattle.

NOTE.—The author is regional agronomist, Soil Conservation Service, Fort Worth, Tex.

Janel Mouton plucks clover blossom growing in mixture with oats. The oats and clover will occupy the land 2 years and will follow 1 year of rice.

In December 1947 the pastures were disked and harrowed twice, the legumes and grass being turned under so that decomposition could take place before the land was prepared for the rice crop in the spring. No fertilizer was applied to the rice at planting time.

Claude Egleson of Bell City, La., harvested 12 barrels per acre when he grew rice after a year of Kobe lespedeza and Bermuda grass pasture, as compared with 8 barrels on land not benefited by pasture improvement.

The Bertinot-Dugal farm near Opelousas, La., in the Grand Coteau Ridge Soil Conservation District used to grow rice 1 year and allow the land to lie idle 1 year. The rice yield ranged from 8½ to 12 barrels per acre.

Now the system is to grow white Dutch clover 2 years and rice 1 year. Grasses such as Bermuda grass, carpet grass, and barnyard grass volunteer in the clover. Rice production following the 2 years of improved pasture averages 17 barrels. One cut of 30 acres averaged 23 barrels in 1948.

The farm originally carried 60 mature cows with an average of 50 percent calf crop. The calves were weak and unhealthy, and many died. The cows were always poor in winter and needed considerable feed to keep them alive.

The farm now carries 120 cows. In 1948 the calf crop was 90 percent and the calves were strong and health with no deaths that year. The cows kept fat all year with very small amounts of feed. In addition, several thousand dollars' worth of clover seed was harvested.

According to David E. Black, in charge of rotation investigations for the experiment station at Crowley, La., the improved pasture rotation usually increases rice yields about 25 percent and beef production about 600 percent.

CANAL LININGS TESTED

(Continued from page 82)

under conditions simulating use. Model testing is done at the River Laboratory where seepage and other factors associated with the performance of linings can be measured with some precision.

3. Field testing at selected sites to determine relative durability under specific site and climatic conditions.

After 1 year, all those who participated in the field test described are pleased and feel that the work is accomplishing its objectives. Construction details, including cost data, have been made available to all cooperators and each is privileged to inspect the installations at will and make his own interpretations concerning the performance of the various types of linings.

CONSERVATION AS SEEN FROM THE HIGHWAY

By H. H. FINNELL

IF LESS dust comes over to west Texas from New Mexico when the winds begin to whoop it up next spring, it will be largely because soil conservation districts have been getting results. At least, that's the way it looks from the highway.

I drove through Central Curry and Southwest Quay Districts last February, inspecting soil erosion conditions, and again in mid-July.

Thirty percent of the cultivated fields were bare and subject to wind action in February. In July, only 13 percent were bare. These are all being fallowed for wheat, and if the operators have luck with their fall seeding, virtually none of the wheatland area of these two districts will be exposed to blowing next spring.

The rest of the fields have crop cover coming on, or residues from crops already harvested, which if well managed will hold the land for the blow season of 1950.

To show how these farmers came through an unfavorable season, making gains against erosion hazards, I risk boring you by citing part of my data.

Not quite half of the 235 fields I inspected were in wheat last February. Eight percent had already been abandoned. Thirty-seven percent were uncertain, mainly because of thin stands, and 55 percent were promising. By sorghum-planting time the abandonment rose to 13 percent.

The wheat that remained turned out better than an average yield though fullness of ground cover could have been better. It has been better in years past. But New Mexico wheat farmers are not hesitant to turn to sorghums when needed to fill in. They did so this year.

You will see sorghums, both listed and drilled, throughout the community. Those depending on the summer crop outnumbered those depending on unprotected fallow 2½ to 1.

My frank opinion is that the 6 percent of fields now gone to weeds may even become a worse hazard next spring than some of the clean fallow if they are turned under late and seeded to wheat over a depleted soil moisture supply.

Still the fact remains that if all the bad luck and bad practice there is room for in the present situation should take place, there will be less soil blowing there in 1950 than in the blow season just past.

A few fields have been planted to sorghums which might have been safely fallowed, using stubble-mulch methods. The general attitude of striving to be safe rather than taking a gambler's chances is much to be admired. Congratulations to eastern New Mexico!

This, you know, is an area generally classed as marginal. The average annual rainfall varies from 15.04 inches in the northwest part of the study area to 18.71 inches on the southeast.

One would be half inclined to say they farm better in a marginal territory than where seasons are surer and too many operators take chances for no other reason than that they feel they don't have to take precautions.

It's a nice thing, balancing land capability with farming methods. It's the thing that ought to be done everywhere. How does *your* conservation look from the highway?

NOTE.—The author is research specialist, Soil Conservation Service, Goodwell, Okla.

REVIEWS

FRONT PORCH FARMER. By Channing Cope. Turner E. Smith & Co. Atlanta. 1949. 171 pp.

"Front Porch Farmer" is a book that should be read at one sitting—and preferably on *your* front porch, on a Sunday afternoon, where you can hear the birds chirping under the lawn sprinkler, listen to the song of the locust, and watch a pair of quail tripping sedately around the shrubbery. By doing it this way, you can get the real feel of the book—as if you actually were chatting with Channing Cope about taking "frustration, confusion, and drudgery" out of farming—making it a foolproof, weatherproof business, as he claims he has done.

First, there as an introduction by Louis Bromfield who describes Channing Cope's story as "exciting and stimulating, as the adventures of an explorer in a new world." "In fact," says Bromfield, "the system of farming that he has developed is a 'new world' as far as farming in the Cotton South is concerned."

Then Cope takes over. He defines his objective: farming in such a fashion "as to hold most of the rain where it falls, where there is no soil loss, where the crops are planted not more than once in a decade, where expensive buildings are unnecessary, where the lands are being constantly improved, where the crops are a match for all the variations of the weather, where there is no drudgery, and where the animals gather the crops in the field." In his foreword he tells how he and a number of other self-styled "Front Porch Farmers" have attained this goal. He is a livestock farmer. To sustain his livestock, he uses kudzu, sericea lespedeza or Coastal Bermuda grass, Ladino clover, and Kentucky 31 fescue. These crops, in proper combination and rotation, provide grazing 365 days of the year.

The rest of the book is devoted to explaining this outline—chatting about it, raising and meeting your objectives, trying enthusiastically to persuade *you* to "go, thou, and do likewise." He warns you about this in the first part of the book, says that he is following the practice of the old Negro preacher who explained his preaching methods as follows: "First I tells 'em what I'm gonna tell 'em; den I tells 'em, and den I tells 'em what I told 'em."

This book is not a scientific treatise (Cope disclaims that at every turn), but his farming operations are based on the best scientific knowledge of agriculture that he can tap anywhere in the country. It is good to see the staff of the Soil Conservation Service mentioned by name frequently. That, incidentally, is one of the devices that makes this such a readable, personalized book. Channing Cope talks of this one and that one (from professional scientists to neighboring farmers), quoting their exact words, just as if he were in fact talking with you over the railing of his front porch.

Cope's foolproof, weatherproof farming was not attained without a good deal of the "sweat of his brow," even though it may sound easy in the telling. His Yellow River Farm was so poor and denuded when he acquired it that he was warned he would "perish to death" with it. It took 22 years to produce the system of farming that he tells about in his book, 22 years of experiments and trials. But his system is so abundantly successful that he cannot restrain his urge to get it spread to the farms of his neighbors, to the Yellow River watershed, to the entire South.

When you come to his last sentence, "Thanks for following us to the conclusion of the story of Yellow River Farm with the promise and the challenge that it offers," you'll probably feel like saying, "Thank *you*, Mr. Cope, it is a mighty good story."

—VERNA C. MOHAGEN.

In October, Soil Conservation Magazine presented condensed versions of several papers read at the Eighth Annual Conference on Conservation, Nutrition and Health. Beginning on this page are two more summaries of Conference papers of wide interest and importance.

WATERSHED MANAGEMENT PROBLEMS. (Ohio Conference.)—At no time have we attempted to face the problem of water control and use in its full sense, declared E. N. Munns, chief, Division of Forest Influences, United States Forest Service. We have approached the problem too much as an engineering one, not as a social problem, and certainly not as a land problem.

The water problem is to a large degree a land problem, Munns asserted. Proper land care means more abundant water, better stream flow, more ground water, and higher quality water. We in America have not yet learned that good land and good water go together. Why? Either our shortages have not been frequent or large enough, or our surpluses have not been damaging enough, or the relation of the problems to the condition and use of land is not yet sufficiently understood to produce the effort necessary to solve some of these problems. The engineer with his slide rule and concrete has been able to promise and deliver, while the land manager aped his works but did not boldly follow where his inner conscience would lead him.

Not all our water problems stem from land misuse, he conceded. But the short-sighted policies and indifference which have characterized our attitudes toward the land as a permanent and continuous source of wealth have contributed heavily.

Hopeful is the increasing weight being given to the watershed aspects of river-basin planning. The public, as well as some engineering authorities themselves, are at last accepting the long-held views of conservationists that the land must be included, along with the rivers, if our waters are to be controlled and put to use on a lasting basis. There is no longer the same indulgence towards partial planning which omits the consideration of the watershed aspects.

The watershed management concept, applied in its full sense, offers the most desirable medium for interrelating the interests of land, water, and people, the speaker stated. Although commonly defined in terms of water relations, watershed management necessarily encompasses all human activities on drainage areas because in one way or another, all these activities affect some phase of water use, behavior, or condition. Without specifically considering these human activities and their various effects, we cannot hope to achieve an optimum condition of soil stability or of water flow. Without adequately taking them into account, we shall not be able successfully to cope with floods, water shortages, or the depletion of soil and cover which so greatly accentuates these water problems.

Many of us forget or fail to recognize that land is a complex of many factors. The art and practice of watershed management require more than a mere working knowledge of the interacting effects of climate, physiography, soils, vegetation, and human use upon water behavior. Indeed, too many technicians engrossed in the details of rainfall, crops, or soils tend to lose sight of the significance of these interrelations, if they ever really recognized them.

The soil is more than a convenient medium for crop production. The rain which is absorbed and not needed by plants or evaporated, is held in this vast natural reservoir for later release to surface or underground sources.

If the soil is not in good condition to absorb this precipitation, its reservoir capacity remains to a greater or less degree, unused. In this way, many benefits may be greatly reduced or lost altogether as surface runoff. Further, this same runoff may wash away large quantities of the rich upper soil, depleting the capacity of our soil reservoir, and reducing its ability to store moisture either for usable supplies downstream, or for plant growth. These same soil and water losses create or add to the harassment of valley communities by floods and sediment.

The vegetative cover, itself a product of soil and climate and man's modifying activities, in turn greatly affects the hydrologic properties of the soil, and indeed the functioning of the whole water cycle.

The type and density of vegetation, including its crown and root systems and its litter, influence the amount of precipitation intercepted and returned to the atmosphere, the water absorptive properties of the soil, the amount and rates of soil moisture extracted, the proportion of surface runoff to total water yield, and the rates of soil losses.

The effects of cover in the winter are no less marked than in the summer. At the Fraser Experimental Forest in Colorado dense young pine stands intercepted and evaporated sufficient snow as to lose to the air about 8.5 percent more water than an open field. The bare open crowns of an aspen stand, on the other hand, not only permitted much snow to reach the ground, but its stems also provided enough protection against sun and wind to increase water storage by 12.5 percent over that in the open field. In summer, the Fraser work shows that the amount of rainfall reaching the ground can be increased. By thinning stands of pine and spruce, up to 61 percent more water reached the ground than in dense stands.

Munns spoke out for the adoption of a national land and water policy which definitely recognizes that the public interest in watershed values is paramount to the interests of individual land owners and operators, or other special groups.

There is a pressing need, said Munns, to build up an attitude towards the soil and its water relations which transcends the market place. This attitude should be reflected in a land and water policy which gives priority to the national security and welfare. It should be reflected in programs of conservation and education which stress individual responsibilities commensurate with individual rights in the ownership or use of the land, or in the enjoyment of its fruits.

IRRIGATION'S ROLE. (Ohio Conference.)—The spread of irrigation into what have heretofore been considered humid sections of the United States is proof that climatic conditions are generally variable with respect to reliable rainfall, declared Allan McCulloch, irrigation expert from Denver, Colo. More and more, it is becoming necessary to furnish additional moisture by irrigation to insure continued high crop production.

Several studies have been made recently, he said, which analyze the occurrence of extended drought periods in humid sections. These studies have brought out the value of irrigation as a means of crop insurance.

Different crops require different quantities of soil moisture to produce satisfactory yields, the speaker pointed out. These requirements vary not only by crop, but by stage of development of the crop, and further vary according to the yield level.

Recently, more attention is being given to the level of moisture maintained in the soil to keep crops developing at a maximum rate, and to obtain maximum yields. Also interrelated is the fertilizer level of various soils and the quantities of commercial fertilizer added to the soil.

In the older irrigated sections of the United States it has been found that more and more attention must be given to the physical characteristics of irrigated soils, especially in regard to their ability to take in and retain soil moisture for plant use. These same factors are extremely important in planning irrigation in humid regions.

McCulloch cited several studies in which moisture-deficient periods have been analyzed to bring out the value of irrigation as a crop-insurance measure in humid regions. He added that a number of soil conservation districts are finding that irrigation is assuming an increasingly important role in establishing soil-building and soil protection for crops.

Several factors are involved in planning irrigation programs for humid regions, McCulloch pointed out. These include water supply, irrigation water requirements, irrigation system capacity requirements, and time and interval of irrigation.

Irrigation in those parts of the United States where there is a reasonable amount of rainfall is a new development which holds great promise of insuring a high level of yield by making water always available to the plant whenever it may be needed, whether it has rained recently or not.

SMOOTHING OUT THE RICE FIELDS

(Continued from page 79)

to the soil and otherwise maintain or increase productivity. It makes cultivation easier and reduces irrigation costs.

There are five steps in the leveling operation:

(1) The old rice field levees are plowed up; (2) the mounds or knolls are cut away by bulldozer; (3) the field is plowed in the customary way; (4) a small, 30-foot land-leveling machine is pulled over the field at least three times; (5) a big, 60-foot land-leveling machine is pulled over the field, twice usually being enough.

Made of a long metal frame with an adjustable blade in the middle, the land-leveling machine scrapes off the dirt from high spots and drops it in low ones as it is pulled back and forth across the field.

NORTHEAST

GOOD SOIL GONE WRONG.—About 8 years ago a fine old stone barn on a tenant-operated farm near Edgemont, just west of Philadelphia, was destroyed by fire. Only the side walls were left standing.

The farm recently was acquired by Adrain Teaf, a Philadelphia insurance man. Prior to rebuilding one wing

Good soil gone wrong.

of the barn, Teaf started to clear away a section to expose the concrete floor. He found he had to dig through an average of 1½ feet of soil to find the floor. Several "test holes" produced the same result.

Teaf discovered that this soil had washed out of an adjoining hillside field that had been "corned" up and down hill during the last 8 years. Several gullies that had been partially plugged told the rest of the story. The soil washed out of the field not only had been deposited rather evenly over the concrete floor of the 180-foot barn, but had buried an access road leading to the barn. Grass was growing atop the erosion-covered road, indicating that pretty fair topsoil had left the cropland.

Teaf now has the offending field laid out in contour strips, and is healing it with ryegrass.

STUBBORN FIELD.—For four generations members of the Easterbrook family unsuccessfully tried to clear and get some use out of a 20-acre field back of their barn. Then SCS engineers working with the South Worcester (Mass.) District came along and lined up a drainage system, helped Harold Easterbrook get needed equipment, and supervised the work. Not all this installation has been completed, but at least half of the field has been plowed and seeded and the rest of it will be in production before long.

GREEN PASTURES.—Arthur Leland and sons, farmers at East Bridgewater, Mass., had been bothered for years because they could get only poor grass from a 10-acre field. It was too wet for any kind of production. Technicians in the Plymouth District laid out a drainage system and a land-clearing program. A shallow ditch, parabolic type, did the job. The Lelands got "a wonderful crop" of clover and timothy. Other conservation installations gave the Lelands "very good pasture," so good that they became one of the three Green Pastures contest winners in Massachusetts in 1948.

SOUTHEAST

SOMETHING ADDED.—Three banks of Monroe County in Conecuh River Soil Conservation District, Ala., have added seven questions to the list used by their representatives when discussing loans with farmers. These banks are the Monroe County Bank and the First National Bank of Mŏnroeville, and the Peoples' Exchange Bank of Frisco City. J. B. Barnett, Jr., cashier of the Monroe County Bank, decided to include the following questions after studying soil and water conservation in the field with Sam Williams and B. D. Ledbetter, of the Soil Conservation Service:

How many acres of crotalaria do you have on your farm?

How many acres of improved pasture?

When was the pasture last fertilized?

How many acres of cover crops did you plant last fall?

Is your farm properly terraced and do you keep up these terraces?

Do you have a district soil conservation plan?

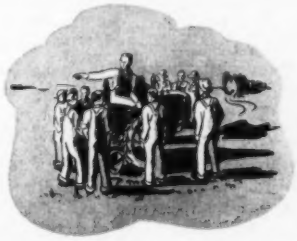
Are you carrying the plan out?

CIVITAN AWARD.—John M. Brown, work unit conservationist at Marietta, Ga., was presented with an honor key and wall plaque, one of the four Civitan International awards at the International Civitan convention held this year in Washington, D. C.

HEADS SOCIETY.—John T. Bregger is being congratulated on his election as president of the American Pomological Society at its recent meeting in Yakima, Wash. Bregger is project supervisor with the Soil Conservation Service at Clemson, S. C.

DIDN'T LOSE A HATFUL.—Farmers in the Taylor County (Ky.) Soil Conservation District are becoming more interested in terraces as they see how they control runoff water during heavy rains, supervisors report. Debs Pike says he "didn't lose a hatful of soil or a gallon of water" from a rolling field he terraced and planted to corn in 1948.

UPPER MISSISSIPPI



OPEN-AIR CLASSROOM.—The vocational agriculture class at Mount Ayr, Iowa, has secured a 5-year lease on a 40-acre tract of land on the highway near Mount Ayr. With the assistance of SCS technicians and the soil conservation district, this class is setting up a series of test plots on various fields and crops, and planning to carry out conservation measures suitable to the area around Mount Ayr.

TEACHING PROP.—The Montcalm Soil Conservation District is the seventh district in Michigan to construct a set of soil-loss plots for demonstrational and educational purposes. The plots were financed by the county governing body and were constructed and will be serviced by the local Vo-Ag and Veterans' Institute.

Robert W. Dowling leads high school band in playing "Erosion."

APPEAL TO THE EAR.—Robert W. Dowling, music supervisor of the Bremen Schools in Fairfield County, Ohio, wrote an original composition called "Erosion" for the high school band to play at the annual music fair. He dedicated it to "those many farmers who are following good soil conservation practices."

The composer described the number as follows: "'Erosion' was written as a descriptive piece for concert band. The work is powerful in descriptive matter and is intended as a jolt to make us mindful of the destructive forces of soil erosion. The composition starts with an introduction of quiet rainfall, done in the clarinets, and progresses through the mournful night-long rains, done in the baritones.

"Summer afternoon showers are depicted by the melodic theme of the trumpets.

"Finally, huge masses of the earth's best soil are brutally rushed downstream by the chromatic passages of the full band. Destruction of the earth's surface is pictured in the coarse blasting of trombones, baritones, and basses as the deluge comes to its powerful end."

Dowling once played the bass fiddle for Paul Whiteman.

With the advent of "Erosion," music now takes its place alongside the artist's brush, the spoken word, the drama, and all other known means of telling the erosion story and the compelling need for soil conservation.

It may reach a segment of society hitherto unreached, or it may simply fortify and further drive home the story to those already informed.

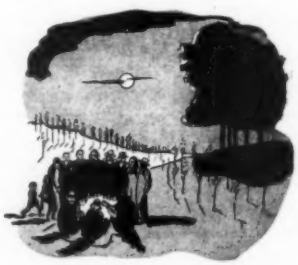
This example of what a music supervisor has done clearly demonstrates that soil conservation can be injected into all courses of study, including the arts, sciences, spelling, and even physical education. It is probably more effectively taught this way than through a special course of study.

Paul Cummins, Fairfield County school superintendent, is very much interested in soil conservation work. Among other things, he helped the district conservationist make a recording for broadcast over a number of radio stations. The recording is useful in explaining to other school officials how teachers can make soil conservation an interesting subject.

—PEARL FOGLE.

MINNESOTA MOVIE.—Supervisors of the East Agassiz (Minn.) Soil Conservation District have shown particular interest in getting out needed information to the public. They have hired a commercial photographer to make a kodachrome 16-mm. film showing soil-mapping, ditch-surveying, and the operations of a tree-planting machine.

DANGER SPOTS SERVED FIRST.—The Manistee (Mich.) Soil Conservation District has developed a new procedure for handling applications in the district. A priority system based on rate of soil decline is being used. The district will give top priority to *natural neighborhood groups in high-erosion-hazard areas.* This is making good use of conservation-needs information that was developed several years ago.



REFORESTATION PROJECT.—The Grand Haven, Mich., Kiwanis Club has inaugurated a soil conservation program and has purchased 80 acres of land for reforestation purposes. During the tree-planting season the club held a twilight meeting on their property and members, wives, and children planted 6,000 trees during the evening.

GRASS FARM.—The Audubon County (Iowa) Soil Conservation District has done extensive work on the Elmer Carlson farm. This farm was planned to be established primarily in grasses and forage production due to the fact that much of the land falls in Classes IV, VI, and VII capability. This project is intended as a practical demon-

stration of what can be done on this type of problem area, as many acres of this kind are found in southeast Audubon County.

WRITING CONTEST.—The Decatur (Ill.) Chapter of Friends of the Land recently sponsored an essay contest which drew 55 high school entries and 142 grade school entries. Prizes totaling $150 were furnished by local banks.

ATTENTION TO OLD APPLICANTS.—The supervisors in the Noble County (Ind.) Soil Conservation District recently called a meeting of all the old applicants to determine how many were still interested in developing farm plans. Forty farmers attended and five others called at the district office the next day to signify their interest. These 45 farmers were assigned to 6 groups and work has been started on 2 of the groups. Farm conservation plans were developed this summer. This method is used to clean up old application lists.

MILLIONS OF TREES.—Four and one-half million trees were planted by district cooperators in Michigan during the spring planting season. Two and one-half million were furnished by the Soil Conservation Service, approximately 1,000,000 came from district nurseries, and the third million came from State and Federal nurseries. The planners' estimate was that there was a need for 9,000,000 trees for planting this past spring.

To make more trees available, the West Ottawa directors have sponsored a program whereby individuals produce their own planting stocks in farm seedbeds. One hundred forty-three such seedbeds have been started in the district and it is expected that each will soon produce from 1,000 to 10,000 plantable trees. In addition, the West Ottawa District sowed sufficient seed in the district nursery to have 800,000 to 1,000,000 trees available in 2 to 3 years.

WESTERN GULF

THEY KNEW GRASSES.—Fifty-three boys averaged 229 points out of a possible 300 in a grass-judging contest held last June 30 in connection with a wool and mohair show at Sonora, Tex.

Three boys tied with perfect scores and two tied with 296 points each in identifying and describing 30 plants in not more than 1 minute each. The ties were run off with 10 more difficult plants. Two boys tied in the run-off and they judged a third group of 4 exceedingly difficult plants.

Fourteen teams of 3 boys each averaged 688 points a team out of a possible 900.

Contestants were members of 4–H or FFA. The contest was sponsored by the supervisors of the Edwards Plateau Soil Conservation District, the Sonora Wool & Mohair Co., and Sonora Lions Club. Eight individual prizes ranged from $15 to $1. Four team prizes ranged from $15 to $5. —E. B. Keng.

RECORD SET.—Cooperators with Rogers County Soil Conservation District, in northeast Oklahoma, built 81 miles of terraces and 13 miles of diversion ditches last year. This equaled the total amount of terraces built in all the years prior to establishment of the district in 1943.

Farmers, with assistance of SCS technicians, built 340 miles of terraces and 39 miles of diversions up to December 31, 1948. Oliver Downs, SCS engineering aid, and his assistant, Billie Hutcheson, were busy all spring running terrace lines and diversion ditches and staking ponds. District farmers this year expect to equal or exceed the record for terrace construction set last year.

BONDS OFFERED.—The Wilbarger-Wichita (Tex.) and Cotton (Okla.) Soil Conservation Districts, are offering $25 to $100 prizes in United States Savings Bonds for accomplishments in soil conservation during 1949. Cooperating with the districts are chambers of commerce, banks, and various organizations.

Aims are to stimulate the application of coordinated conservation programs to the land, and to call attention to the operations of soil conservation districts.

VETCH STOPS EROSION, TOO.—The war-famed jeep, known for its rugged ability to keep going under all conditions, has met its match on the farm. Vetch did it.

L. L. Bair of Garland, Tex., was cutting oats and vetch for hay. The contractor baling the hay was using a jeep for part of the operations. The jeep worked well for a couple of hours then began to slow down. When the contractor left in it for lunch, it stopped on the highway.

Shifted into four-wheel drive, it still wouldn't move. Investigation showed that 3-foot-long vetch runners had entwined around the driveshaft in such a thick coil that the shaft couldn't turn.

The contractor has since shown profound respect for vetch. —Huey Whitehurst.

SOUTHWEST

A NOTE ON LOVEGRASS.—Weeping lovegrass, a drought-resistant plant from Africa, now does double duty in Roosevelt County, according to Herb Cavett, Portales, N. Mex., SCS man in this area.

After experiments for the last 10 years, weeping lovegrass now is proving its value in protecting eroding fields and providing excellent forage, Cavett says.

Until this year, only a few farmers and ranchers had been successful in establishing good stands of this grass. The story is different now. Ample moisture has resulted in good stands where the grass was planted in furrows. It now appears, Cavett says, that broadcast planting, either in fields or on native pastures, is a failure.

An excellent example of the successful seeding of weeping lovegrass is to be found on the farm of K. A. Flatt, 6 miles southeast of Portales. Flatt, who is in the Roosevelt Soil Conservation District, recently harvested a 13-acre field planted a year ago and obtained enough seed to plant 300 acres, which he plans to do.

Flatt deep-listed this 13-acre field early in June 1948. A few days later he chiseled the furrows. The ridges were split back to kill weeds on June 17, and seed then was broadcast over the ridges from the back of a pick-up truck. Cavett, who assisted Flatt in working out his conservation plan, estimates that less than 5 percent of the seed falling on the ridges came on, while an almost perfect stand was obtained in the furrows.

Flatt says he had good luck with this planting. Two days after the field was seeded, a heavy rain fell, so heavy in fact that a lot of the seed floated away. However, enough lodged in the furrows to provide a good stand.

Cavett points out that there are more than 3,000,000 weeping lovegrass seed in a pound. As little as 1 pound of seed to the acre, properly planted, would be more than could develop into growing plants, but this is probably as little as it is economical to use, the conservationist says. Flatt mixed his seed with sand and sifted it by hand from the back of his pick-up truck.

The carrying capacity of weeping lovegrass is at least twice as much as the common range grasses, and some farmers believe it is even higher, Cavett says.

The common rule in this area is to provide 32 acres of range grass to the cow. Lovegrass will take care of a cow on 16 acres, and B. M. Schumpert, another farmer in this area, believes that a good stand, with plenty of moisture, will take care of a cow on only 2 acres. Schumpert reports that he pastures 75 cows on 125 acres, and the animals couldn't keep up with the growth during the summer.

Flatt says that the land upon which he obtained such a good stand of lovegrass had been damaged by wind erosion to the extent that it wouldn't have been profitable to cultivate it for any other crop. He feels that this land now is being used for its best productive purpose—grass.

THIS FIELD WAS THIRSTY.—Water diverted from roadside ditches is enabling A. M. Towner to produce more than enough feed for 53 head of hogs on 6 acres of alfalfa.

Towner's farm is in the Central Curry Soil Conservation District, near Albuquerque, N. Mex. After terracing a 20-acre field about 7 years ago, he found that he could flood-irrigate about half of it by diverting runoff water from the roadside ditches.

Part of the field was heavily infested with blueweed, but Towner planted 6 acres to alfalfa anyway. This year he has been grazing his 53 hogs on the alfalfa tract and finds that he has feed to spare.

With the assistance of SCS technicians, Towner now plans to rebuild his terraces and make them higher and stronger. He also plans to double his alfalfa acreage.

DISTRICT OWNS TEST FARM.—The Mosca-Hooper Soil Conservation District in Alamosa County, Colo., is the only one in the State and probably one of the few in the entire country to own its own experimental farm.

When the Mosca-Hooper District was organized in 1943, farm machinery was scarce and the supervisors realized that they had many problems to solve, according to L. B. Casselman, secretary of the district and president of the Colorado Association of Soil Conservation Districts.

"We eventually bought and paid for all of our machinery, but we realized that we needed to know a lot more about conservation practices suited to this area," Casselman said. "That is why we purchased 80 acres of land 4 miles northeast of Mosca in March 1948."

At the time of the purchase all of the land was in brush. The land now has been cleared, part of it is being leveled, a large irrigation ditch is being constructed, and a complete conservation plan is being worked out with the assistance of SCS technicians.

In order to acquaint farmers over a wide area with the work to be done on the experimental farm, a field demonstration was held last July with various types of farm machinery being demonstrated.

The 80 acres are to be planted to different varieties of alfalfa and pasture grasses. Different plots are to be handled differently, some to be fertilized and some not.

In this manner, actual practices that can be applied on farms in the area can be worked out, Casselman says. Actual expense records are to be kept in the area to determine whether the practices are too expensive to be practiced or if they are successful.

After the farm has been placed in operation, it is the plan of the district supervisors to allow 4-H Club members to use certain parts for farming purposes so experiments can be carried out.

PACIFIC

A VERY SPECIAL SHEEPSKIN.—A milestone in the advancement of conservation education in western agriculture was reached this summer at Oregon State College with the graduation of the first student to complete the soil and water option under the agricultural engineering curriculum.

The graduate was Ivan A. Custer, now employed with the Soil Conservation Service at Richland, Oreg. Custer received a B. S. degree from Harvard in connection with his naval training, but transferred to OSC following his release from the Navy.

The revised curriculum leads to the degree of Bachelor of Science in agricultural engineering granted by the school of engineering. Under this curriculum, it is necessary for a student to decide at the beginning of his junior year which of the three options he wishes to specialize in, namely, soil and water, power and machinery, or farm structures.

Included in the agricultural engineering course work are classes in the basic sciences of engineering and, in addition, such advanced civil engineering courses as structural analysis, reinforced concrete, hydraulics, and hydraulic machinery. In addition to these pertinent engineering courses, the student receives special instruction in soils, soil conservation engineering, irrigation engineering, etc. Prior to submitting the new agricultural engineering curriculum to the college authorities for approval, it was thoroughly discussed with engineers of the Soil Conservation Service and the Bureau of Reclamation, and their suggestions and recommendations were incorporated.

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